BÀI TẬP BỔ SUNG ĐẠI SỐ QUAN HỆ

Cho lược đồ cơ sở dữ liệu COMPANY như sau:

EMPLOYEE

Fname	Minit	Lname	Ssn	Bdate	Address	Sex	Salary	Super_ssn	Dno

DEPARTMENT

Dname	Dnumber	Mgr_ssn	Mgr_start_date

DEPT_LOCATIONS

Dnumber	Dlocation

PROJECT

Pname	Pnumber	Plocation	Dnum

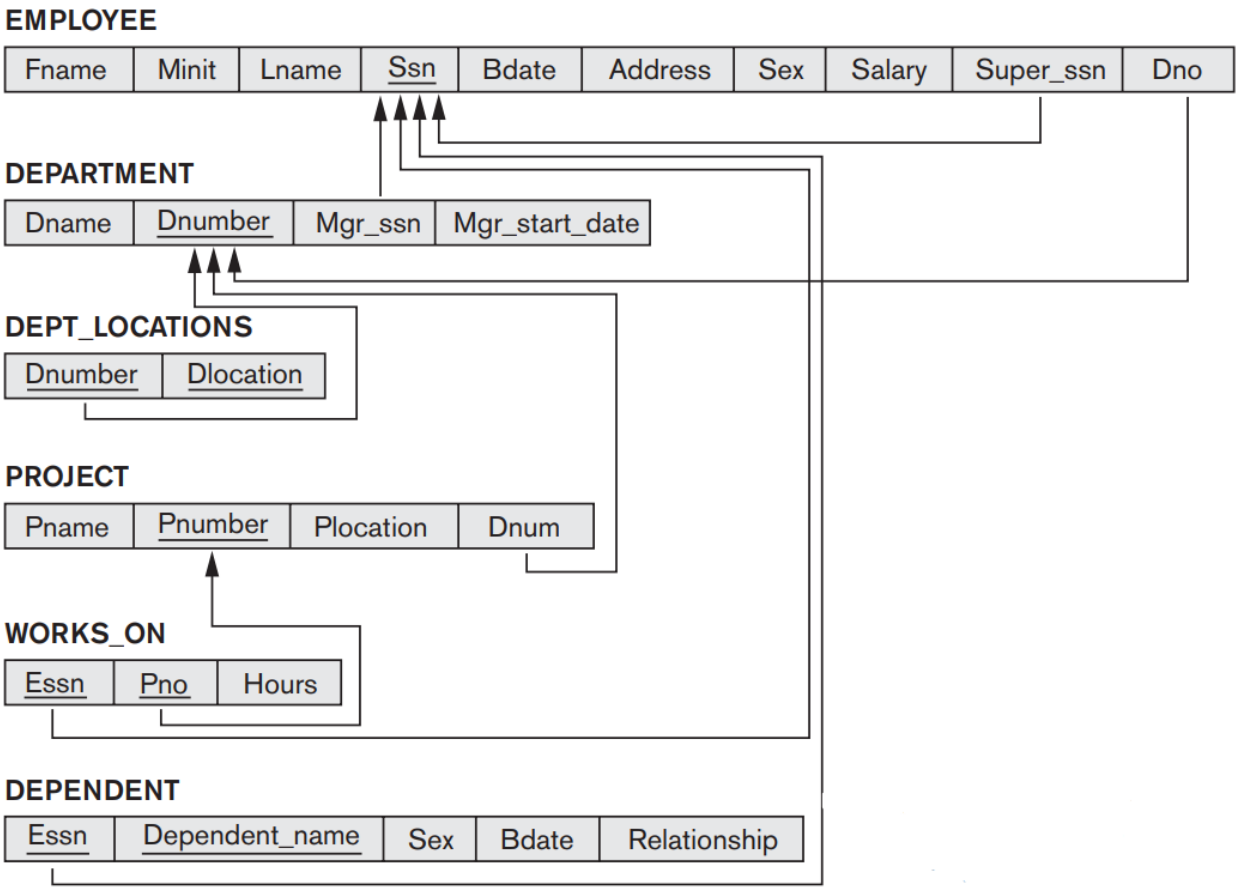
WORKS_ON

Essn	Pno	Hours

DEPENDENT

Essn	Dependent_name	Sex	Bdate	Relationship

Và các ràng buộc như sau:



Thực hiện các yêu cầu sau bằng ngôn ngữ đại số quan hệ:

1. Retrieve the name and address of all employees who work for the 'Research' department

2. For every project located in 'Stafford', list the project number, the controlling department number, and the department manager's last name, address, and birth date

3. Find the names of employees who work on *all* the projects controlled by department number 5.

4. Make a list of project numbers for projects that involve an employee whose last name is 'Smith', either as a worker or as a manager of the department that controls the project.

5. List the names of all employees with two or more dependents

6. Retrieve the names of employees who have no dependents

7. List the names of managers who have at least one dependent

Lời giải:

Câu 1:

$$RESEARCH\_DEPT \leftarrow \sigma_{Dname='Research'}(DEPARTMENT)$$
$$RESEARCH\_EMPS \leftarrow (RESEARCH\_DEPT \bowtie_{Dnumber=Dno} EMPLOYEE)$$
$$RESULT \leftarrow \pi_{Fname,\ Lname,\ Address}(RESEARCH\_EMPS)$$

Câu 2:

$$STAFFORD\_PROJS \leftarrow \sigma_{Plocation='Stafford'}(PROJECT)$$
$$CONTR\_DEPTS \leftarrow (STAFFORD\_PROJS \bowtie_{Dnum=Dnumber} DEPARTMENT)$$
$$PROJ\_DEPT\_MGRS \leftarrow (CONTR\_DEPTS \bowtie_{Mgr\_ssn=Ssn} EMPLOYEE)$$
$$RESULT \leftarrow \pi_{Pnumber,\ Dnum,\ Lname,\ Address,\ Bdate}(PROJ\_DEPT\_MGRS)$$

Câu 3:

$$DEPT5\_PROJS \leftarrow \rho_{(Pno)}(\pi_{Pnumber}(\sigma_{Dnum=5}(PROJECT)))$$
$$EMP\_PROJ \leftarrow \rho_{(Ssn,\ Pno)}(\pi_{Essn,\ Pno}(WORKS\_ON))$$
$$RESULT\_EMP\_SSNS \leftarrow EMP\_PROJ \div DEPT5\_PROJS$$
$$RESULT \leftarrow \pi_{Lname,\ Fname}(RESULT\_EMP\_SSNS * EMPLOYEE)$$

Câu 4:

$$SMITHS(Essn) \leftarrow \pi_{Ssn}(\sigma_{Lname='Smith'}(EMPLOYEE))$$
$$SMITH\_WORKER\_PROJS \leftarrow \pi_{Pno}(WORKS\_ON * SMITHS)$$
$$MGRS \leftarrow \pi_{Lname,\ Dnumber}(EMPLOYEE \bowtie_{Ssn=Mgr\_ssn} DEPARTMENT)$$
$$SMITH\_MANAGED\_DEPTS(Dnum) \leftarrow \pi_{Dnumber}(\sigma_{Lname='Smith'}(MGRS))$$
$$SMITH\_MGR\_PROJS(Pno) \leftarrow \pi_{Pnumber}(SMITH\_MANAGED\_DEPTS * PROJECT)$$
$$RESULT \leftarrow (SMITH\_WORKER\_PROJS \cup SMITH\_MGR\_PROJS)$$

Câu 5:

$$T1(Ssn,\ No\_of\_dependents) \leftarrow {}_{Essn}\Im_{COUNT\ Dependent\_name}(DEPENDENT)$$
$$T2 \leftarrow \sigma_{No\_of\_dependents>2}(T1)$$
$$RESULT \leftarrow \pi_{Lname,\ Fname}(T2 * EMPLOYEE)$$

Câu 6:

$$\text{ALL\_EMPS} \leftarrow \pi_{\text{Ssn}}(\text{EMPLOYEE})$$
$$\text{EMPS\_WITH\_DEPS(Ssn)} \leftarrow \pi_{\text{Essn}}(\text{DEPENDENT})$$
$$\text{EMPS\_WITHOUT\_DEPS} \leftarrow (\text{ALL\_EMPS} - \text{EMPS\_WITH\_DEPS})$$
$$\text{RESULT} \leftarrow \pi_{\text{Lname, Fname}}(\text{EMPS\_WITHOUT\_DEPS} * \text{EMPLOYEE})$$

Câu 7:

$$\text{MGRS(Ssn)} \leftarrow \pi_{\text{Mgr\_ssn}}(\text{DEPARTMENT})$$
$$\text{EMPS\_WITH\_DEPS(Ssn)} \leftarrow \pi_{\text{Essn}}(\text{DEPENDENT})$$
$$\text{MGRS\_WITH\_DEPS} \leftarrow (\text{MGRS} \cap \text{EMPS\_WITH\_DEPS})$$
$$\text{RESULT} \leftarrow \pi_{\text{Lname, Fname}}(\text{MGRS\_WITH\_DEPS} * \text{EMPLOYEE})$$